CLAIMS

What is claimed is:

1. A method for processing grid layout, comprising:

generating a fiducial graph for a grid in a given dimension, the fiducial graph comprising fiducials and constraints of the grid, each constraint having a size preference, the size preference comprising a size and elastic properties;

traversing the fiducial graph, combining the size preferences of the constraints into a size preference for the grid in the given dimension;

assigning a size to the grid; and

assigning positions to the grid fiducials by traversing the fiducial graph, allocating sizes within the grid size to the grid constraints in the given dimension.

2. The method of claim 1, wherein generating the fiducial graph further comprises:

grouping constraints into parallel constraints if the constraints are between a pair of fiducials; and

grouping constraints into series constraints if a first constraint is in series with a second constraint.

3. The method of claim 2, wherein the fiducial graph is a series-parallel fiducial graph and generating the fiducial graph further comprises:

grouping constraints from the fiducial graph into a series-parallel composition tree having a root constraint being either a parallel or series constraint.

4. The method of claim 3, wherein combining the size preferences of the constraints into the size preference for the grid further comprises:

computing a size preference for each constituent constraint of the series-parallel composition tree culminating with a size preference for the root constraint, the size preference of the root constraint being the size preference for the grid.

5. The method of claim 4, wherein computing the size preference for a parallel constraint comprises:

applying a max operation to the size preferences of the constraints grouped within the parallel constraint.

6. The method of claim 4, wherein computing the size preference for a series constraint comprises:

applying an add operation to the size preferences of the constraints grouped within the series constraint.

7. The method of claim 3, wherein assigning positions to the grid fiducials further comprises:

allocating a size within the grid size to each constraint; and

assigning a position to a fiducial such that the distance between the fiducial and a head fiducial of a constraint is the size of the constraint.

8. The method of claim 7, wherein allocating a size to each constraint comprises:

dividing the grid size among each constituent constraint of the series-parallel composition tree, the size allocated to a constraint grouped within a parallel constraint being the size allocated to the parallel constraint, the size allocated to a constraint grouped within a series

constraint being computed by applying a divide operation to size preferences of constituent constraints within the series constraint and to an overall size allocated to the constituent constraints within the series constraint.

9. The method of claim 1, wherein the fiducial graph is a non-series-parallel fiducial graph and combining the size preferences of the constraints into a size preference for the grid further comprises:

assigning an initial size preference to each fiducial in the fiducial graph; and

traversing constraints in forward and reverse traversals to accumulate size preferences at each fiducial, resulting in an accumulated size preference between each fiducial and a designated fiducial.

10. The method of claim 9, wherein the designated fiducial is the head fiducial of the grid, and the size preference of the grid is the accumulated size preference at the tail fiducial of the grid.

11. The method of claim 9, wherein the designated fiducial is the tail fiducial of the grid, and the size preference of the grid is the accumulated size preference at the head fiducial of the grid.

12. The method of claim 9, wherein accumulating size preferences comprises:

combining the size preference of a fiducial with the size preference of a constraint having the fiducial as its head fiducial, resulting in a first resultant size preference;

combining the first resultant size preference with the size preference of the tail fiducial of the constraint, resulting in a second resultant size preference; and

replacing the size preference of the tail fiducial with the second resultant size preference if the second resultant size preference is different from the size preference of the tail fiducial.

13. The method of claim 12, wherein the first resultant size preference results from applying an add operation to the size preference of the fiducial and the size preference of the constraint.

14. The method of claim 12, wherein the second resultant size preference results from applying a max operation to the first resultant size preference and the size preference of the tail fiducial of the constraint.

15. The method of claim 9, wherein accumulating size preferences comprises:

combining the size preference of a fiducial with the size preference of a constraint having the fiducial as its tail fiducial, resulting in a first resultant size preference;

combining the first resultant size preference with the size preference of the head fiducial of the constraint, resulting in a second resultant size preference; and

replacing the size preference of the head fiducial with the second resultant size preference if the second resultant size preference is different from the size preference of the head fiducial.

16. The method of claim 15, wherein the first resultant size preference results from applying a subtraction operation subtracting the size preference of the constraint from the size preference of the fiducial.

17. The method of claim 15, wherein the second resultant size preference results from applying a max operation to the first resultant size preference and the size preference of the head fiducial of the constraint.

18. The method of claim 9, wherein the fiducial graph is traversed until the accumulated size preference at each fiducial is constant.

19. The method of claim 9, wherein the initial size preference of the designated fiducial has rigid elastic properties.

20. The method of claim 9, wherein the initial size preference of a non-designated fiducial has stretchy elastic properties.

21. The method of claim 9, further comprising:

storing a set of back-links for each fiducial in the fiducial graph; and

adding a constraint to the set of back-links for a fiducial if a backward traversal of the constraint contributed to the accumulated size preference of the fiducial, each back-link preventing subsequent backward traversals of a constraint.

22. The method of claim 21, wherein preventing subsequent backward traversals of a constraint comprises:

storing a set of disabled back-links for the fiducial graph;

adding a constraint to the set of disabled back-links for the fiducial graph if a backward traversal is attempted from a fiducial on a constraint that is stored in a set of back-links associated with the fiducial; and

restarting calculation of the grid size preference, avoiding backward traversal of constraints in the set of disabled back-links.

23. The method of claim 9, further comprising:

for each fiducial, storing a predecessor fiducial in a chain of fiducials that contributed to the accumulated size preference of the fiducial.

24. The method of claim 9, further comprising:

marking fiducials during a forward or backward traversal to prevent loops in which a traversal path passes through a fiducial more than once.

25. The method of claim 9, further comprising:

sorting constraints in order of increasing elastic properties prior to traversal, traversing constraints that most rigidly constrain the size preferences of other fiducials first.

26. The method of claim 9, further comprising:

constraining the size preference of a fiducial having an assigned position, the size preference comprising rigid elastic properties and a minimum size and a preferred size both equal to the distance between the position of the designated fiducial and the assigned position of the fiducial.

27. The method of claim 1, wherein the fiducial graph is a non-series-parallel fiducial graph and assigning positions to the grid fiducials further comprises:

pre-assigning positions to the head and tail fiducials of the grid such that the distance between the head and tail fiducials is the size allocated to the grid;

traversing constraints in forward and reverse traversals accumulating size preferences at each fiducial, resulting in accumulated size preferences between each fiducial and the head fiducial and between each fiducial and the tail fiducial; and

assigning positions for each non-assigned fiducial such that a position for a fiducial is computed after computing positions for each non-assigned successor fiducial in critical chains extending from the fiducial.

28. The method of claim 27, further comprising:

assigning positions for each non-assigned fiducial such that a non-assigned fiducial is assigned a position after assigning a position for each successor fiducial that can be reached from the non-assigned fiducial by a forward traversal of a constraint, unless the successor fiducial precedes the non-assigned fiducial in a critical chain.

29. The method of claim 27, wherein computing a position for a fiducial comprises:

dividing the grid size between a first size preference and a second size preference resulting in an allocated size, the first size preference comprising the size preference between the non-assigned fiducial and the head fiducial, the second size preference comprising the size preference between the non-assigned fiducial and the tail fiducial, the allocated size being the distance between the head fiducial and the non-assigned fiducial; and

assigning a position to the non-assigned fiducial such that the distance between the non-assigned fiducial and the head fiducial is the allocated size.

30. The method of claim 27, further comprising:

pre-assigning a position to a grid origin fiducial in the given dimension.

31. The method of claim 27, wherein assigning a position for a non-assigned fiducial comprises:

constraining the position assigned to the non-assigned fiducial to be no less than a position assigned to a predecessor fiducial.

32. The method of claim 27, wherein assigning a position for a non-assigned fiducial comprises:

constraining the position assigned to the non-assigned fiducial to be no greater than a position assigned to a successor fiducial.

33. The method of claim 27, wherein assigning a position for a non-assigned fiducial comprises:

constraining the position assigned to the non-assigned fiducial to be no less than a position assigned to a predecessor fiducial plus a minimum size of the size preference associated with a constraint between the fiducial and the predecessor fiducial.

34. The method of claim 27, wherein assigning a position for a non-assigned fiducial comprises:

constraining the position assigned to the non-assigned fiducial to be no greater than a position assigned to a successor fiducial minus a

minimum size of the size preference associated with the constraint between the fiducial and the successor fiducial.

35. The method of claim 27, wherein assigning a position for a non-assigned fiducial comprises:

constraining the position assigned to the non-assigned fiducial to be no less than a position assigned to the head fiducial plus a minimum size of the size preference from the head fiducial to the fiducial.

36. The method of claim 27, wherein assigning a position for a non-assigned fiducial comprises:

constraining the position assigned to the non-assigned fiducial to be no greater than a position assigned to the tail fiducial minus a minimum size of the size preference to the tail fiducial from the fiducial.

37. The method of claim 1, wherein a grid element has an origin coupled to a fiducial in the given dimension, and

the fiducial graph comprises a first constraint and a second constraint for the grid element, the first constraint having a size preference from a head fiducial of the grid element to the origin, the second constraint having a size preference from the origin to a tail fiducial of the grid element.

38. The method of claim 1, wherein a grid element has an origin not coupled to a fiducial in the given dimension, and

the fiducial graph comprises a constraint for the grid element having a total size preference being a result of applying an add operation to a first size preference and a second size preference, the first size preference being a size preference from a head fiducial of the grid

element to the origin, and the second size preference being a size preference from the origin to a tail fiducial of the grid element, the method further comprising:

dividing a total size allocated to the grid element between the first size preference and the second size preference resulting in an allocated size; and

assigning a position to the origin in the given dimension such that the distance between the origin and the head fiducial of the grid element is the allocated size.

39. The method of claim 1, wherein the grid further comprises an origin, the fiducial graph comprising an origin fiducial in the given dimension, further comprising:

computing a size preference from the head fiducial of the grid to the origin fiducial; and

computing a size preference from the origin fiducial to the tail fiducial of the grid.

40. The method of claim 39, further comprising:

adjusting the size preferences before and after the origin fiducial such that the result of applying an add operation to the size preferences equals the size preference from the head fiducial to the tail fiducial of the grid.

41. The method of claim 1, wherein the grid represents a table having table elements, each table element having an origin in the given dimension further comprising:

aligning the origins of one or more table elements in the given dimension by creating a fiducial in the underlying grid and attaching the origins of the one or more table elements to the fiducial.

42. A system for processing grid layout, comprising:

a layout processor, the layout processor generating a fiducial graph for a grid in a given dimension, the fiducial graph comprising fiducials and constraints of the grid, each constraint having a size preference, the size preference comprising a size and elastic properties;

the layout processor traversing the fiducial graph, combining the size preferences of the constraints into a size preference for the grid in the given dimension;

the layout processor assigning a size to the grid; and

the layout processor assigning positions to the grid fiducials by traversing the fiducial graph, allocating sizes within the grid size to the grid constraints in the given dimension.

43. The system of claim 42, wherein the fiducial graph is a series-parallel fiducial graph and the layout processor generating a fiducial graph further comprises:

the layout processor grouping constraints from the fiducial graph into a series-parallel composition tree having a root constraint being either a parallel or series constraint.

44. The system of claim 43, wherein the layout processor combining the size preferences of the constraints into the size preference for the grid further comprises:

the layout processor computing a size preference for each constituent constraint of the series-parallel composition tree culminating with a size preference for the root constraint, the size preference of the root constraint being the size preference for the grid.

45. The system of claim 44, wherein the layout processor computing the size preference for a parallel constraint comprises:

the layout processor applying a max operation to the size preferences of the constraints grouped within the parallel constraint.

46. The system of claim 44, wherein the layout processor computing the size preference for a series constraint comprises:

the layout processor applying an add operation to the size preferences of the constraints grouped within the series constraint.

47. The system of claim 43, wherein the layout processor assigning positions to the grid fiducials further comprises:

the layout processor allocating a size within the grid size to each constraint; and

the layout processor assigning a position to a fiducial such that the distance between the fiducial and a head fiducial of a constraint is the size of the constraint.

48. The system of claim 47, wherein the layout processor allocating a size to each constraint comprises:

the layout processor dividing the grid size among each constituent constraint of the series-parallel composition tree, the size allocated to a constraint grouped within a parallel constraint being the size allocated to the parallel constraint, the size allocated to a constraint grouped within a series constraint being computed by the layout processor applying a divide operation to size preferences of constituent constraints within the series constraint and to an overall size allocated to the constituent constraints within the series constraint.

49. The system of claim 42, wherein the fiducial graph is a non-series-parallel fiducial graph and the layout processor combining the size preferences of the constraints into a size preference for the grid further comprises:

the layout processor assigning an initial size preference to each fiducial in the fiducial graph; and

the layout processor traversing constraints in forward and reverse traversals to accumulate size preferences at each fiducial, resulting in an accumulated size preference between each fiducial and a designated fiducial.

50. The system of claim 49, wherein the layout processor accumulating size preferences comprises:

the layout processor combining the size preference of a fiducial with the size preference of a constraint having the fiducial as its head fiducial, resulting in a first resultant size preference;

the layout processor combining the first resultant size preference with the size preference of the tail fiducial of the constraint, resulting in a second resultant size preference; and

the layout processor replacing the size preference of the tail fiducial with the second resultant size preference if the second resultant size preference is different from the size preference of the tail fiducial.

51. The system of claim 49, wherein the layout processor accumulating size preferences comprises:

the layout processor combining the size preference of a fiducial with the size preference of a constraint having the fiducial as its tail fiducial, resulting in a first resultant size preference;

the layout processor combining the first resultant size preference with the size preference of the head fiducial of the constraint, resulting in a second resultant size preference; and

the layout processor replacing the size preference of the head fiducial with the second resultant size preference if the second resultant size preference is different from the size preference of the head fiducial.

52. The system of claim 51, wherein the first resultant size preference results from the layout processor applying a subtraction operation subtracting the size preference of the constraint from the size preference of the fiducial.

53. The system of claim 49, further comprising:

the layout processor storing a set of back-links for each fiducial in the fiducial graph; and

the layout processor adding a constraint to the set of back-links for a fiducial if a backward traversal of the constraint contributed to the accumulated size preference of the fiducial, each back-link preventing subsequent backward traversals of a constraint.

54. The system of claim 49, further comprising:

for each fiducial, the layout processor storing a predecessor fiducial in a chain of fiducials that contributed to the accumulated size preference of the fiducial.

55. The system of claim 49, further comprising:

the layout processor marking fiducials during a forward or backward traversal to prevent loops in which a traversal path passes through a fiducial more than once.

56. The system of claim 49, further comprising:

the layout processor sorting constraints in order of increasing elastic properties prior to traversal, the layout processor traversing constraints that most rigidly constrain the size preferences of other fiducials first.

57. The system of claim 49, further comprising:

the layout processor constraining the size preference of a fiducial having an assigned position, the size preference comprising rigid elastic properties and a minimum size and a preferred size both equal to the distance between the position of the designated fiducial and the assigned position of the fiducial.

58. The system of claim 42, wherein the fiducial graph is a non-series-parallel fiducial graph and the layout processor assigning positions to the grid fiducials further comprises:

the layout processor pre-assigning positions to the head and tail fiducials of the grid such that the distance between the head and tail fiducials is the size allocated to the grid;

the layout processor traversing constraints in forward and reverse traversals accumulating size preferences at each fiducial, resulting in accumulated size preferences between each fiducial and the head fiducial and between each fiducial and the tail fiducial; and

the layout processor assigning positions for each non-assigned fiducial such that a position for a fiducial is computed after computing positions for each non-assigned successor fiducial in critical chains extending from the fiducial.

59. The system of claim 42, wherein a grid element has an origin coupled to a fiducial in the given dimension, and

the fiducial graph comprises a first constraint and a second constraint for the grid element, the first constraint having a size preference from a head fiducial of the grid element to the origin, the second constraint having a size preference from the origin to a tail fiducial of the grid element.

60. The system of claim 42, wherein a grid element has an origin not coupled to a fiducial in the given dimension, and

the fiducial graph comprises a constraint for the grid element having a total size preference being a result of the layout processor applying an add operation to a first size preference and a second size preference, the first size preference being a size preference from a head fiducial of the grid element to the origin, and the second size preference being a size preference from the origin to a tail fiducial of the grid element, the system further comprising:

the layout processor dividing a total size allocated to the grid element between the first size preference and the second size preference resulting in an allocated size; and

the layout processor assigning a position to the origin in the given dimension such that the distance between the origin and the head fiducial of the grid element is the allocated size.

61. The system of claim 42, wherein the grid further comprises an origin, the fiducial graph comprising an origin fiducial in the given dimension, further comprising:

the layout processor computing a size preference from the head fiducial of the grid to the origin fiducial; and

the layout processor computing a size preference from the origin fiducial to the tail fiducial of the grid.

62. The system of claim 42, wherein the grid represents a table having table elements, each table element having an origin in the given dimension further comprising:

the layout processor aligning the origins of one or more table elements in the given dimension by creating a fiducial in the underlying grid and attaching the origins of the one or more table elements to the fiducial.

63. A computer program product comprising:

a computer-usable medium;

a set of computer operating instructions embodied on the medium, including instructions for processing grid layout, comprising instructions for:

generating a fiducial graph for a grid in a given dimension, the fiducial graph comprising fiducials and constraints of the grid, each constraint having a size preference, the size preference comprising a size and elastic properties;

traversing the fiducial graph, combining the size preferences of the constraints into a size preference for the grid in the given dimension;

assigning a size to the grid; and

assigning positions to the grid fiducials by traversing the fiducial graph, allocating sizes within the grid size to the grid constraints in the given dimension.

64. The computer program product of claim 63, wherein the fiducial graph is a series-parallel fiducial graph and the instructions for generating the fiducial graph comprise further instructions for:

grouping constraints from the fiducial graph into a series-parallel composition tree having a root constraint being either a parallel or series constraint.

65. The computer program product of claim 64, wherein the instructions for combining the size preferences of the constraints into the size preference for the grid comprise further instructions for:

computing a size preference for each constituent constraint of the series-parallel composition tree culminating with a size preference for the root constraint, the size preference of the root constraint being the size preference for the grid.

66. The computer program product of claim 64, wherein the instructions for assigning positions to the grid fiducials comprise further instructions for:

allocating a size within the grid size to each constraint; and

assigning a position to a fiducial such that the distance between the fiducial and a head fiducial of a constraint is the size of the constraint.

67. The computer program product of claim 63, wherein the fiducial graph is a non-series-parallel fiducial graph and the instructions for combining the size preferences of the constraints into a size preference for the grid comprise further instructions for:

assigning an initial size preference to each fiducial in the fiducial graph; and

traversing constraints in forward and reverse traversals to accumulate size preferences at each fiducial, resulting in an accumulated size preference between each fiducial and a designated fiducial.

68. The computer program product of claim 67, wherein the instructions for accumulating size preferences comprise further instructions for:

combining the size preference of a fiducial with the size preference of a constraint having the fiducial as its head fiducial, resulting in a first resultant size preference;

combining the first resultant size preference with the size preference of the tail fiducial of the constraint, resulting in a second resultant size preference; and

replacing the size preference of the tail fiducial with the second resultant size preference if the second resultant size preference is different from the size preference of the tail fiducial.

69. The computer program product of claim 67, wherein the instructions for accumulating size preferences comprise further instructions for:

combining the size preference of a fiducial with the size preference of a constraint having the fiducial as its tail fiducial, resulting in a first resultant size preference;

combining the first resultant size preference with the size preference of the head fiducial of the constraint, resulting in a second resultant size preference; and

replacing the size preference of the head fiducial with the second resultant size preference if the second resultant size preference is different from the size preference of the head fiducial.

70. The computer program product of claim 67, further comprising instructions for:

storing a set of back-links for each fiducial in the fiducial graph; and

adding a constraint to the set of back-links for a fiducial if a backward traversal of the constraint contributed to the accumulated size preference of the fiducial, each back-link preventing subsequent backward traversals of a constraint.

71. The computer program product of claim 67, further comprising instructions for:

for each fiducial, storing a predecessor fiducial in a chain of fiducials that contributed to the accumulated size preference of the fiducial.

72. The computer program product of claim 67, further comprising instructions for:

marking fiducials during a forward or backward traversal to prevent loops in which a traversal path passes through a fiducial more than once.

73. The computer program product of claim 63, wherein the fiducial graph is a non-series-parallel fiducial graph and the instructions for assigning positions to the grid fiducials comprise further instructions for:

pre-assigning positions to the head and tail fiducials of the grid such that the distance between the head and tail fiducials is the size allocated to the grid;

traversing constraints in forward and reverse traversals accumulating size preferences at each fiducial, resulting in accumulated size preferences between each fiducial and the head fiducial and between each fiducial and the tail fiducial; and

assigning positions for each non-assigned fiducial such that a position for a fiducial is computed after computing positions for each non-assigned successor fiducial in critical chains extending from the fiducial.

74. The computer program product of claim 63, wherein a grid element has an origin coupled to a fiducial in the given dimension, and

the fiducial graph comprises a first constraint and a second constraint for the grid element, the first constraint having a size preference from a head fiducial of the grid element to the origin, the second constraint having a size preference from the origin to a tail fiducial of the grid element.

75. The computer program product of claim 63, wherein a grid element has an origin not coupled to a fiducial in the given dimension, and

the fiducial graph comprises a constraint for the grid element having a total size preference being a result of applying an add operation to a first size preference and a second size preference, the first size preference being a size preference from a head fiducial of the grid element to the origin, and the second size preference being a size preference from the origin to a tail fiducial of the grid element, further comprising instructions for:

dividing a total size allocated to the grid element between the first size preference and the second size preference resulting in an allocated size; and

assigning a position to the origin in the given dimension such that the distance between the origin and the head fiducial of the grid element is the allocated size.

76. The computer program product of claim 63, wherein the grid further comprises an origin, the fiducial graph comprising an origin fiducial in the given dimension, further comprising instructions for:

computing a size preference from the head fiducial of the grid to the origin fiducial; and

computing a size preference from the origin fiducial to the tail fiducial of the grid.

77. The computer program product of claim 63, wherein the grid represents a table having table elements, each table element having an origin in the given dimension, further comprising instructions for:

aligning the origins of one or more table elements in the given dimension by creating a fiducial in the underlying grid and attaching the origins of the one or more table elements to the fiducial.

78. A computer data signal embodied in a carrier wave comprising a code segment for processing grid layout, the code segment comprising instructions for:

generating a fiducial graph for a grid in a given dimension, the fiducial graph comprising fiducials and constraints of the grid, each constraint having a size preference, the size preference comprising a size and elastic properties;

traversing the fiducial graph, combining the size preferences of the constraints into a size preference for the grid in the given dimension;

assigning a size to the grid; and

assigning positions to the grid fiducials by traversing the fiducial graph, allocating sizes within the grid size to the grid constraints in the given dimension.

79. The computer data signal of claim 78, wherein the fiducial graph is a series-parallel fiducial graph and the instructions of the code segment for generating the fiducial graph comprise further instructions for:

grouping constraints from the fiducial graph into a series-parallel composition tree having a root constraint being either a parallel or series constraint.

80. The computer data signal of claim 79, wherein the instructions of the code segment for combining the size preferences of the constraints into the size preference for the grid comprise further instructions for:

computing a size preference for each constituent constraint of the series-parallel composition tree culminating with a size preference for the root constraint, the size preference of the root constraint being the size preference for the grid.

81. The computer data signal of claim 79, wherein the instructions of the code segment for assigning positions to the grid fiducials comprise further instructions for:

allocating a size within the grid size to each constraint; and

assigning a position to a fiducial such that the distance between the fiducial and a head fiducial of a constraint is the size of the constraint.

82. The computer data signal of claim 78, wherein the fiducial graph is a non-series-parallel fiducial graph and the instructions of the code segment for combining the size preferences of the constraints into a size preference for the grid comprise further instructions for:

assigning an initial size preference to each fiducial in the fiducial graph; and

traversing constraints in forward and reverse traversals to accumulate size preferences at each fiducial, resulting in an accumulated size preference between each fiducial and a designated fiducial.

83. The computer data signal of claim 82, wherein the instructions of the code segment for accumulating size preferences comprise further instructions for:

combining the size preference of a fiducial with the size preference of a constraint having the fiducial as its head fiducial, resulting in a first resultant size preference;

combining the first resultant size preference with the size preference of the tail fiducial of the constraint, resulting in a second resultant size preference; and

replacing the size preference of the tail fiducial with the second resultant size preference if the second resultant size preference is different from the size preference of the tail fiducial.

84. The computer data signal of claim 82, wherein the instructions of the code segment for accumulating size preferences comprise further instructions for:

combining the size preference of a fiducial with the size preference of a constraint having the fiducial as its tail fiducial, resulting in a first resultant size preference;

combining the first resultant size preference with the size preference of the head fiducial of the constraint, resulting in a second resultant size preference; and

replacing the size preference of the head fiducial with the second resultant size preference if the second resultant size preference is different from the size preference of the head fiducial.

85. The computer data signal of claim 78, wherein the fiducial graph is a non-series-parallel fiducial graph and the instructions of the code segment for assigning positions to the grid fiducials comprise further instructions for:

pre-assigning positions to the head and tail fiducials of the grid such that the distance between the head and tail fiducials is the size allocated to the grid;

traversing constraints in forward and reverse traversals accumulating size preferences at each fiducial, resulting in accumulated size preferences between each fiducial and the head fiducial and between each fiducial and the tail fiducial; and

assigning positions for each non-assigned fiducial such that a position for a fiducial is computed after computing positions for each non-assigned successor fiducial in critical chains extending from the fiducial.

86. The computer data signal of claim 78, wherein a grid element has an origin coupled to a fiducial in the given dimension, and

the fiducial graph comprises a first constraint and a second constraint for the grid element, the first constraint having a size preference from a head fiducial of the grid element to the origin, the second constraint having a size preference from the origin to a tail fiducial of the grid element.

87. The computer data signal of claim 78, wherein a grid element has an origin not coupled to a fiducial in the given dimension, and

the fiducial graph comprises a constraint for the grid element having a total size preference being a result of applying an add operation to a first size preference and a second size preference, the first size preference being a size preference from a head fiducial of the grid

element to the origin, and the second size preference being a size preference from the origin to a tail fiducial of the grid element, the code segment further comprising instructions for:

dividing a total size allocated to the grid element between the first size preference and the second size preference resulting in an allocated size; and

assigning a position to the origin in the given dimension such that the distance between the origin and the head fiducial of the grid element is the allocated size.

88. The computer data signal of claim 78, wherein the grid further comprises an origin, the fiducial graph comprising an origin fiducial in the given dimension, the code segment further comprising instructions for:

computing a size preference from the head fiducial of the grid to the origin fiducial; and

computing a size preference from the origin fiducial to the tail fiducial of the grid.

89. The computer data signal of claim 78, wherein the grid represents a table having table elements, each table element having an origin in the given dimension, the code segment further comprising instructions for:

aligning the origins of one or more table elements in the given dimension by creating a fiducial in the underlying grid and attaching the origins of the one or more table elements to the fiducial.